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Science and Technology in The German Democratic Republic— A Preliminary Assessment

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Scientific and Technical Intelligence Committee

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Note to Reader

The Scientific and Technical Intelligence Committee is the DCI Committee whose mission in part is to advise and assist the DCI with respect to production of intelligence on foreign science and technology, to advise the National Foreign Intelligence Board, and to coordinate activity, information processing, and analyses in these areas. The Committee reports to the DCI through the DDCI and to NFIB through the Board's Secretariat.

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Preface

In 1984, the German Democratic Republic (GDR) approached the Department of State with a proposal to establish a science and technology exchange agreement. The Department of State requested that the Scientific and Technical Intelligence Committee (STIC) and the Technology Transfer Intelligence Committee (TTIC) support their negotiating process with an assessment of the GDR's S&T infrastructure and technical capability. It is very difficult to assess science and technology in the GDR because of the very limited Intelligence Community capability in this area; however, this paper addresses most of the important areas for the negotiating process. The preliminary conclusions of this paper are subject to change in the future due to more indepth analysis.

The integrator of this paper is [redacted] Executive Secretary, STIC. 25X1
Further information on this paper may be obtained by calling the STIC Secretariat [redacted] The principal authors and contributors to this paper are: 25X1

[redacted]	Central Intelligence Agency 25X1 Central Intelligence Agency Executive Secretary, Technology Transfer Intelligence Committee
Roy Frontani	Air Force/Foreign Technology Division (Chairman, STIC Structural Materials Working Group)
Major (P) John Weske	US Army/Armed Forces Medical Intelligence Center (Chairman, STIC Life Science Working Group)
N. H. Krikorian	Department of Energy, Los Alamos National Laboratories
[redacted]	Defense Intelligence Agency (Chairman, STIC Computer Working Group) 25X1
Denver Stone	Army/Foreign Science and Technology Center (Chairman, STIC Electro-optics Working Group)

Analysts at the National Security Agency made a significant contribution to this paper. More information on East German pyroelectric detectors can be found in [redacted] 25X1

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Science and Technology in The German Democratic Republic— A Preliminary Assessment 25X1

Key Judgments

In general, we believe that the German Democratic Republic would benefit from a US-GDR scientific exchange program, but US gains would be small. US scientific and technical (S&T) intelligence gains will also be small, but East German and Soviet gains could be significant. The Soviet Intelligence Services are certain to receive all information collected by the East Germans. 25X1

The decisionmaking structure of the GDR consists of a hierarchical chain of command topped by the Socialist Unity Party of Germany (SED). The State Planning Commission (SPK) works closely with the SED to plan economic goals. This planning process takes into account the availability of material and human resources, anticipated technological progress, and other factors. The SPK transmits tentative targets for each economic sector to the government ministries which in turn pass them to subordinate combines, enterprises, and basic production units. The Ministry for Science and Technology is the main governmental organization for managing and directing scientific research. It selects projects of national importance for inclusion in the state plan for science and technology and monitors the plan's fulfillment. The Ministry for National Defense monitors R&D in the GDR to ensure that the military receives adequate supplies of weapons, technology, and equipment; its technology and weaponry administration is involved in R&D planning. 25X1

Worldwide, no East European intelligence service has been as active or as successful in illegal technology transfer as the East German Ministry of State Security (MFS). The Science and Technology Department (SWT) of the Main Administration for Intelligence (HVA) is responsible for both the acquisition and evaluation of S&T materials. Initially the SWT confined its interests to the collection of information on military and armaments technology from the Federal Republic of Germany (FRG) and NATO member nations, but, in the mid-1970s, began acquiring Western technology by both legal and illegal means to close the technology gap with the West. These MFS/HVA efforts have been able to supply East German industry with technological processes or production capabilities that would otherwise not have been available or which would have been far more expensive to obtain legally. The MFS works closely with the Soviet Intelligence Service (SIS) as does East German military intelligence with the GRU. Basic decisions are made by the directors of the MFS and the KGB, and the directors of the two military intelligence services with the SIS acting as the senior partner in each case. The KGB liaison officer at

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HVA headquarters in East Berlin also levies collection requirements for the SIS, as does his GRU counterpart on East German military intelligence. Department IV of the HVA, which has special responsibility for military S&T collection, also has a KGB special liaison officer who levies SIS collection requirements. [redacted] 25X1

The GDR's interests in illegal technology transfer encompass the full range of advanced technologies important to military and industrial development. These include microelectronics, communications, computer software, chemical technology, nuclear and conventional energy, materials technology, and bioengineering. The principle focus is on developments that contribute to the military and industrial strength of West Germany and NATO. Concern with US developments that contribute to NATO is high. Priorities for technology collection may be altered by Soviet requirements. [redacted] 25X1

There is the likelihood of a large-scale MFS effort to use academics as willing or unwilling sources as part of the GDR's broader effort to collect S&T intelligence. Many East German academics work for the MFS. Such work is in fact a prerequisite for advancement at home and access to foreign travel to attend scholarly meetings or to undertake research projects at Western institutions. [redacted] 25X1

We are unable to completely describe East German technical accomplishments because of a lack of information and analysts studying the GDR. We do know, however, that the GDR exports six times as much to the Soviet Union (USSR) as it imports from the USSR. We believe that the East Germans have active R&D programs in many technical areas and have been successful in developing an indigenous capability in many areas. Some of these programs may be in support of the Soviet Union in areas where the Soviets have not been able to develop technology for themselves. We do not expect the GDR life sciences base to be very innovative; however, they do have some areas of excellence like toxicology and instrumentation. Funding for academic and basic research probably is inadequate, and applied research and development tends to utilize commonly accepted methodology and off-the-shelf technology. [redacted] 25X1

The GDR is very advanced in some aspects of metallurgy including melt processing of metals. Their electron beam and plasma melting and coating equipment is very sophisticated. The East German capability in machine tools, robots, and flexible manufacturing automation at least equals that of all the other Warsaw Pact countries and their equipment compares

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favorably to similiar equipment produced in Western countries. Very little is known about the overall status of electro-optics research in the GDR, but the East Germans have been capable of producing sophisticated optics for a long time. We know that they are working on lasers and related optical devices for the military and that they have developed pyroelectric detectors that could be useful to the military. They have produced more than 100 unsophisticated to sophisticated optoelectronic components for controllers. The East Germans have an excellent capability to produce stable and radio isotopes, which they export. The GDR is heavily committed to nuclear power and has many trained nuclear scientists and technicians. The GDR probably has not developed a reactor fuel reprocessing capability but is strong in the other areas of the nuclear fuel cycle including production, radiation monitoring equipment, and waste handling. East Germany is the most advanced Bloc country in microelectronics and computers. Their success is attributable to their well-funded efforts in industrial and economic espionage, their pre/post-war technology base, and an excellent capability to transfer technology from the West. 25X1

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The East Germans do not appear to be very aggressive in requesting S&T visits to the United States because only 310 East Germans requested visits since 1975. The distribution of visit requests in the areas of chemicals, materials, and semiconductors is similar to that noted during an examination of S&T visit requests by other East European countries. There was a surprisingly small number of East German visit requests in computer-related areas. The distribution of visit requests by year suggests that the Soviets may have used East German S&T visitors as surrogates for the acquisition of S&T information, since the number of East German S&T visit requests varied inversely with poor US-USSR relations from 1978 through 1982. 25X1

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The Scientific and Technical Infrastructure

The German Democratic Republic has a strong commitment to science and technology. This commitment is formalized in Article 17 of its constitution which states: "Science and research as well as the application of their findings are essential foundations of socialist society and are fostered by the state in every respect. The GDR promotes science and education with the aim of projecting and enriching society and the life of the citizens, of mastering the scientific technical revolution as well as of guaranteeing the constant progress of socialist society."

The East German investment in science and technology is large and growing. In 1983, more than 8 billion marks were assigned to S&T—roughly twice the S&T budget of 1971.

Scientific Policy Making in the German Democratic Republic

The decisionmaking structure in the GDR consists of a hierarchical chain of command topped by the Socialist Unity Party of Germany (SED) and its general secretary, Erich Honecker. SED leaders play a direct role in major policy decisions affecting outlays for and direction of S&T research and development.

The Politburo, the policymaking body of the party, currently consists of 21 members and four candidate members. Among the Politburo members whose opinions carry considerable weight in S&T policymaking are Guenter Klieber, a technocrat and industrial minister with an interest in microelectronics, and Guenter Mittag, the SED secretary who oversees the economy. The Secretariat administers SED policy; each of its 11 members has a specific area of responsibility. Under the Central Committee are about 40 departments employing professional party workers who collect data from lower-level party officers, produce "guidelines" for their work, and monitor the performance of government ministries in implementing party decisions. The Science Department and the Research and Technical Development Department are responsible for working with the ministries involved in S&T and R&D efforts and ensure that they fulfill the annual and five-year plans. 25X1

In the fall of 1981, the SED Politburo issued a resolution on improving S&T management and planning. Since then various laws and decrees have focused on improving efficiency in this sector, tying planning more closely to production, and calculating the cost-benefit ratio. A 1982 order designed to link enterprise planning more closely to S&T objectives stipulates that S&T drafts must be submitted ahead of other sections of the economic plan. A 1983 decree on improving cost accounting stipulates that all S&T planning targets and criteria must be formulated accurately and complied with. An overall economic account (cost-benefit billing) projects the economic effects of R&D projects, both for the year when they are introduced and for the following year. 25X1

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State Planning Commission. The State Planning Commission (SPK) is headed by Gerhard Schuerer, who is also a candidate member of the SED Politburo and a deputy chairman of the Council of Ministers. Working closely with top SED authorities, the SPK charts economic goals, taking into account the availability of material and human resources, anticipated technological progress, foreign trade potential, and the need for regular improvements in the standard of living. The SPK has ties to the country's national defense efforts: the Defense Law of 1978 stipulates that economic management must support the national defense at all times. The SPK includes a special department for the armed forces headed by a general who is one of the Commission's vice chairmen. 25X1

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The SPK transmits tentative targets for each economic sector annually to the government ministries which in turn pass them to subordinate combines, enterprises, and basic production units. At each level, a

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proposed plan is developed based on estimates of the resources available. These plans then move upward again to the SPK where various elements are integrated and any differences with the initial targets are reconciled. After considering further recommendations from top party bodies, the SPK fixes the plan for each economic sector. Targets are then sent to the subordinate units; at the lowest levels, the annual plan is further subdivided into quarterly and monthly plans for each production unit.

National Research Council. The National Research Council was founded in 1957 as an advisory body to the Council of Ministers on S&T research and development. It advises the SPK on questions of science and technology; plans and coordinates research and development in the natural sciences and technology; supervises the implementation of research plans; and coordinates research capacity and available resources. It is assisted by central working groups of scientific and technical experts and commissions specializing in specific research areas.

Ministry for Science and Technology. The Ministry for Science and Technology was established in 1967. It is the main governmental organization involved in managing and directing scientific research, particularly in the area of applied science, and plays a key role in articulating S&T issues. It selects projects of national importance to be included in the state plan for science and technology and monitors the plan's fulfillment. Its minister, Herbert Weiz, holds a prominent place in GDR S&T efforts. In his capacity as a deputy chairman of the Council of Ministers, he oversees the Research Council and the Academy of Sciences.

Ministry for National Defense. The Ministry for National Defense reaches into every corner of the economy to ensure that the military receives adequate supplies of weaponry, technology, and equipment. It is involved in R&D planning through its Technology and Weaponry Administration, which is headed by a deputy minister. According to information published in 1980, this administration includes subordinate departments responsible for technology administration, innovation, research and development, weaponry, planning and coordination, procurement, medical technology, and S&T relations and supply. The Planning and Coordination Department receives the materiel plans for the military services and coordinates them with the relevant sectors of industry. The overall plan must then be approved by the SPK.

Industrial Decision Making—The Combines. The formation of combines (Kombinate)—industrial enterprises merged into large, tightly integrated economic units—began in the GDR during 1966 and 1967. Since then, they have developed into what East German economists describe as "the chief pillar of modern economic management." The combines were created to provide unified management for various enterprises, from research to production and sales, and to speed up scientific-technical progress through their own R&D efforts.

Industrial combines group together enterprises that produce identical or similar products, employ similar technologies, or represent interconnected production states. They may include ancillary enterprises, research institutions, production plants, and their own foreign trade enterprises. R&D personnel, many of whom had previously worked in independent facilities, now work largely within combines with direct links to the production process. For example, the R&D facilities of Karl Zeiss-Jena employ about 7,500 people, one-third of them highly trained technicians. As of 1984, centrally managed industry included 132 combines with 20 to 40 enterprises each and an average work force of 25,000; there were also 93 district-managed combines employing a total of 206,000 people.

Since about 1980, the combines have been directly subordinate to the national ministries. A combine director general is personally accountable to his supervisor minister, who theoretically has the exclusive right to appoint, dismiss, or issue instructions to him. The director general has similar authority over his enterprise directors. In addition, he can assign goals for exceeding state plan targets to individual enterprises; change enterprise tasks or shift them among enterprises; transfer sections from one enterprise to another; create new sections; and decide which tasks (for example, R&D) are to be centralized within the combine.

Academy of Sciences of the GDR. About 20,000 people, including 7,000 scholars and researchers, currently work in the academy and its 100 institutes and research establishments. Major research centers are located in East Berlin, Liepzig, Jena, Dresden, Griefwald, and Rostokk. The overall mission of the academy is to conduct basic and applied research with special emphasis on the application of scientific-technical progress to production. The academy plans and coordinates research in the natural, mathematical, and technical sciences and coordinates functions in some fields of social and medical research. It also cooperates with state-owned combines and enterprises in drafting long-range R&D strategies and speeding up the development of new products, technologies, and processes. Its institutes have worked closely with industry in research on laser technology, ceramics, medical technology, pharmacology, and robotics.

In June 1984, a new statute expanded the duties of the Academy of Sciences and increased its authority in international scientific cooperation, including the expansion of relations with scientific institutions in non-Communist countries. The statute also established a council to advise the academy president, Werner Scheler, on drafting plans, supervising plan fulfillment, and organizing domestic and international cooperation relations.

Council for Mutual Economic Assistance (CEMA). CEMA has served as a framework for cooperation among its members since its founding in 1949. Its 1971 Comprehensive Program set the guidelines for CEMA activity through 1990 calling for joint planning through interstate coordinating bodies. The CEMA Committee on Scientific-Technical Cooperation is responsible for organizing and coordinating multilateral S&T cooperation. The program also emphasizes multilateral projects for developing new regional sources of fuels, energy, and raw materials—projects that are jointly planned and executed. In 1982 more than 200 agreements and contracts on joint research, development, design, and experimental projects were in effect.

The most traditional form of cooperation in planning is through the coordination of national five-year plans. In addition, every year the directors of research institutes within CEMA meet to discuss their projects at which time plans are drawn up, tasks assigned, and responsibilities laid down. In 1982, there were 63 national scientific installations in CEMA countries, including four in the GDR, acting as coordinating centers for multilateral scientific-technical cooperation in selected problem groups. Direct relations among enterprises, combines, and institutions also play an important role in cooperation among CEMA countries

According to an East German article, scientific cooperation among the CEMA countries intensified considerably during 1981-83. Scientists from member states worked on projects in 23 multilateral problem commissions, 14 in natural sciences, and nine in social sciences. In addition, the multilateral Problem Commission on Physical-Technical Problems of Energy Science was established and its task groups on electrical physics, electrical engineering, and low temperature plasma physics began working.

According to the same article, one of the most effective forms of multilateral cooperation is the CEMA base laboratory, which operates as a joint research installation. Such laboratories have been formed within the Problem Commissions on Computer Engineering, Semiconductor Physics, High-Molecular Compounds, Kinetics, Catalysis, and Petrochemistry. Eight of the 42 such laboratories are in the GDR, most of them involved in geophysical research. In 1983, six research areas were given priority for further cooperation efforts: energetics, scientific equipment construction, computer engineering and data processing, raw materials sciences, biotechnology, and the exploitation of natural resources.

The Soviet Union has received some important benefits from CEMA, especially since 1970. Contributions have been made to robotics, numerical programmable controls for machine tools, anticorrosion techniques,

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and optical and computer technologies. Without the contribution of the other members of CEMA, the development of the Ryad-3 and -4 series of computers by the Soviets might have taken much longer. [redacted] 25X1

Bilateral GDR-USSR Cooperation. Cooperation with the USSR extends to all sectors of the GDR economy, from basic research to technical development and production. Recent cooperation has focused on joint S&T efforts in the advanced processing of raw materials and the applications of microelectronics and robotic equipment. In October 1984, the two countries signed an agreement on cooperation in science, technology, and production through the year 2000. According to this agreement, joint GDR-USSR research will increase in the following key areas: extraction and utilization of domestic raw materials; refinement of raw materials and fuels; microelectronics, optoelectronics, and robot technology; coal refining; and biotechnologies, especially microbiological processes applicable to agriculture. [redacted]

Scientific and Engineering Education in the GDR. A law establishing an "integrated socialist education system," promulgated in 1965, provides for a state-controlled secular school system. The core of the system is the 10-year comprehensive polytechnical facilities administered by the schools or by factories. At the 10th grade level, teachers single out exceptional students for two more years of study at the expanded secondary school—the most important channel for entry into colleges and universities. In 1977, only 9 percent of those completing the 10th grade were so selected. The remaining students generally receive some form of vocational training. [redacted]

The 71 universities and colleges in the GDR are the country's highest academic institutions; to be admitted, a student must pass the *Abitur* (university entrance exam). Other criteria for the selection of candidates include their academic records, educational potential and social activities; the social composition of the population; and the needs of society. A full-time university course lasts four to five years, except for medicine which requires six. The curriculum covers general subjects such as Marxism-Leninism as well as the field of specialization. Students in the natural and technical sciences also acquire practical experience in laboratories and enterprises [redacted] 25X1

The GDR offers three academic degrees. The first, bachelor of a particular academic discipline—for example, B.Sc. (medicine) or B.A. (philosophy)—requires completion of a university course of study that includes the submission and public defense of a written thesis. The second, that of doctor of a particular discipline—that is, Dr. med. or Dr. phil.—is awarded after the public defense of a "doctoral thesis B" or a corresponding dissertation of the highest academic quality. To attain either of the doctoral degrees, the graduate must hold the preceding degree. The only exception is the honorary doctorate—Dr. h.c. (doctor honoris causa), which is awarded to academics and leading public figures for excellence in their particular sphere of activity. [redacted] 25X1

Technology Transfer

East Germany has been a traditional beneficiary of COCOM-controlled Western strategic technology 25X1 from the Federal Republic of Germany because of its common border and special political and economic relationship with West Germany. The GDR has been heavily dependent on the FRG for controlled, dual-use (that is, civil-military) technology for its industrial and military development. Moreover, the FRG is generally acknowledged as the major source of illegal acquisition of advanced technology by the Soviet Union; much of that technology originates in the United States and some of it reaches the Soviets from West Germany via East Germany. [redacted] 25X1

[redacted] 25X1 who defected to West Germany [redacted] 25X1 provided the first detailed picture of the GDR's role in illegal technology transfer acquisition and, in particular, those of the Ministry of State Security (MFS) [redacted] 25X1 25X1 25X1 allocated 5 million East German marks for the illegal acquisition of documentation and models of advanced technology. They spent 3 million marks of their funds and acquired technology that was subsequently estimated to have saved East German industry 300

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million marks, a leverage factor of 100 over their expenditure. Since East German industry is required to return 10 percent of such savings for the upkeep of the MFS, they were under no compulsion to exaggerate their estimates of the value of these acquisitions. There is no reason to believe that the situation has changed significantly. [redacted]

There are numerous examples of East German high-technology espionage and illegal trade operations in the West, particularly in the FRG. These sometimes involve the suborning of single individuals in large manufacturing firms, the use of small Western trading firms as intermediaries, the creation of dummy front organizations for particular operations, and the employment of small firms with a covert tie to an East German governmental entity. Representatives of East Germany's MFS usually masquerade as trade representatives and often carry out negotiations within East Germany itself making it difficult for West German counterintelligence to be effective in anything but direct espionage cases. By analogy with other East European countries, we believed that certain requirements for illegal high-technology acquisitions are levied on the GDR trading mission in Moscow by Soviet authorities [redacted]

The fact that West Germany regards East Germany as merely another portion of a "Greater Germany" facilitates the movement of goods and people between the two regions. Movement of goods in illegal trade between the FRG and GDR, however, often takes place through Switzerland or Austria as transit areas, rather than directly across-border into the GDR. It is so easy to move goods, particularly small items, across the border into the GDR from the FRG, that it is surprising that this activity is not observed taking place more often. Perhaps it does, of course, and we are simply not aware of it [redacted]

Worldwide, no East European intelligence service has been as active or as successful in illegal technology transfer as the East German MFS. The Science and Technology Department (SWT) of the Main Administration for Intelligence (HVA) is responsible for both the acquisition and evaluation of S&T materials. Initially the SWT confined its interests to the collection of information on military and armaments technology from the FRG and NATO member nations. In the mid-1970s, the East German Government adopted a policy which concentrated all available resources on closing the technology gap with the West (estimated at that time to be 20 years) and began acquiring Western technology by both legal and illegal means. The HVA, naturally, plays its part in this effort as well as continuing its activities in military technology transfer. These MFS/HVA efforts have been able to supply East German industry with technological processes or production capacities that would not otherwise have been available or which would have been far more expensive to obtain legally. [redacted] 25X1 25X1

The SWT receives its mission allocations from a variety of sources. There is a list of requirements in support of economic development on file in CEMA. The East German economy has a set of long- and short-term priorities and the Soviets also call for support for their economic and military needs. The MFS also undertakes its own initiatives based on its own appraisal of the needs of the East German economy. Collection activities are also carried out on behalf of several MFS-connected economic enterprises with highly specialized technical problems (for example, Robotron, the main East German developer and producer of robotics equipment). The Ministry for Science and Technology (MFT), the Academy of Sciences, the Research Council, and the Ministry for University and Technical School Affairs may also set requirements. Occasionally, the Ministry for Foreign Affairs may establish acquisition priorities. [redacted] 25X1 25X1

The executive management of the MFS handles matters of cooperation with the Soviet Intelligence Services (SIS) in supporting the Soviet military-industrial complex. The MFS works closely with the SIS as does East German military intelligence with the GRU. Basic decisions are made by the directors of the MFS and the KGB, and the directors of the two military intelligence services with the SIS acting as the senior partner in each case. The directors work out long-range planning issues. The directors of the S&T departments of the corresponding services also remain in direct frequent contact with each other. For example, the director of the SWT travels to Moscow at 25X1

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least once a year to consult with his Soviet KGB counterpart. The KGB liaison officer at HVA headquarters in East Berlin also levies collection requirements for the SIS, as does his GRU counterpart. Department IV of the HVA, which has special responsibility for military S&T collection, also has a KGB special liaison officer who levies SIS collection requirements. [redacted]

The SWT works closely with the KGB, and the KGB is given access to all intelligence information pertaining to military matters. The Soviets can and do set specific collection requirements in both military and nonmilitary areas. The Soviet liaison officer also receives MFS acquisition lists and can acquire material from these lists for forwarding to Moscow. [redacted]

The GDR's interests in illegal technology transfer encompass the full range of advanced technologies important to military and industrial development. These include microelectronics, communications, computer software, chemical technology, nuclear and conventional energy, materials technology, and bioengineering. The principle focus is on developments that contribute to the military and industrial strength of West Germany and NATO and concern with US developments that contribute to NATO is high. Priorities for technology collection may be altered by Soviet requirements. In fact, there is evidence of periodic Soviet displeasure over East German emphasis on technology acquisitions for its own industrial and military development with corresponding neglect of Soviet requirements. [redacted]

Informatio [redacted] indicate the likelihood of a large-scale MFS effort to use academics as willing or unwilling sources as part of the broader effort to collect S&T intelligence. Many East German academics work for the MFS. Such work is in fact a prerequisite for advancement at home and access to foreign travel to attend scholarly meetings or to undertake research projects at Western institutions. Professors working for the MFS attend conferences at home and abroad where they pump their Western colleagues and identify candidates for future recruitment. These academics are well situated to gain access to advanced production techniques and emerging technologies. [redacted]

Technical Areas

Life Sciences

East Germany has traditional strengths in the biological and biochemical sciences and in precision scientific instrumentation. Some of these strengths, equal and surpass similar capabilities within the Warsaw Pact countries. Nevertheless, East German progress in the life sciences, with very few exceptions, does not match the West and Japan in terms of quality or quantity. In general, East German academic and basic research capability in the life sciences is often not readily translated into useful end products. [redacted]

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East German scientists are considered to be among the world leaders in certain fields of modern toxicology. They maintain superior interest and expertise in quantitative structure activity relationship (QSAR) analysis. An application of this technology is the use of sophisticated computer programs to predict the chemical, physical, and toxicological properties of newly synthesized chemicals. In application, the system can design a chemical molecular structure that is likely to provide a desirable property. [redacted]

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There are at least three centers for the storage and production of CBW agents. In addition, there is a fairly extensive CBW R&D program. In particular, experimental work is carried on at the Institute of Microbiology in Jena (animal experiments) and the Institute of Chemical Toxicology (organophosphorus chemistry). Unclassified East German publications indicate research activity in organophosphorus chemistry, pesticides, alkaloids, cholinesterase inhibitors, as well as psychotropic and neurotropic drugs. [redacted]

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East Germany has engaged in scientific exchanges within the Warsaw Pact. One exchange between the Institute of Biophysics in Leipzig and the Institute for Biophysics in Moscow involves the study of thermobioluminescence using both natural and artificial

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membranes. Another cooperative venture was the development, with the Czechoslovaks, of automatic injectors for CW agent antidotes.

East Germany has an active pharmaceutical industry which produces items for consumption within the Warsaw Pact countries and for export. Agreements within the Warsaw Pact tend to minimize duplication of effort. Overall, pharmaceuticals produced by the GDR, particularly at "GERMED" in Dresden, are probably superior in quality and efficacy to Soviet drugs. End items include cardiovascular drugs, sex hormones, chemotherapeutics, antibiotics, and bioactive peptides. East German biomedical equipment and instrumentation are the best in Eastern Europe. Further, the East Germans are world leaders in the biological effects of aerosol pollutants and the applications of therapeutic aerosols in medicine.

East German sports psychology and medicine are the most sophisticated in the world. Psychological techniques include imagery, covert rehearsal, and autonomic conditioning. Conditioning techniques for athletes also have direct application to performance enhancement in many military tasks. Conversely, East Germany has very poor clinical psychological resources, such as psychopathology assessment devices, psychotherapy techniques, and psychodynamic application theory.

The GDR is active in researching the biological effects of nonionizing electromagnetic radiation (NIEMR). Applications include the development of occupational safety standards for microwave exposure and laser therapy in medicine. However, their principal contribution is the manufacture of precision instrumentation, equipment, and optical components. These are the best in Eastern Europe. End items include a device to measure near-field electromagnetic radiation, high-quality surgical lasers, and optical filters, which are used throughout Eastern Europe. A visit by a GDR scientist to the United States resulted in the East German development of a very fast (picosecond) spectrometer.

There is a lack of data on East German military human engineering/human performance R&D. Within the GDR civilian sector, human factors engineering is referred to as work sciences. There are work science groups within all of the twenty-plus government ministries. Overall, human factors R&D is conducted in a fragmented fashion and is clearly immature; the primary emphasis is on worker safety and job satisfaction rather than on the design of machine systems to optimize the man-machine interface.

The East German biotechnology programs are not comparable to those in the West, Japan, and the Soviet Union. GDR scientists are capable of innovative molecular biology/genetic engineering research; however, support and funding for existing programs are inadequate. Attempts to develop cooperative agreements in this field with the Soviets have enjoyed limited success. East German scientists study all phases of molecular biology, microbiology, pharmacology, and biochemistry. Western journals and publications are readily available. The lead institute for molecular biology is the Karl Marx University in Leipzig. Key scientists are Dr. S. M. Rapporort and Dr. Harold Rosenthal. Dr. Rapporort is the director of the East German research plan (MOGEVUS) in molecular biology and genetics. This plan is designed to assure growth and progress in these sciences for the rest of the century through a coordinated national effort between various GDR institutes and universities. Program success will be dependent on enhanced government cooperation and financial support.

There are centers for plant pathology whose personnel interact with foreign colleagues and attend conferences. At the Institute of Phytopathology in Aschersleben there is an International Bank of Plant Pathogens.

Metal Processing and Materials
The German Democratic Republic is very advanced in basic metal melt processes. The Manfred von Ardenne Research Institute (MARI) in Dresden is one of the foremost electron beam (EB) research institutes in the world. They design and produce highly sophisticated EB guns and systems. The latest gun, designated EH 1200/50, is a 1,200 kW gun used for producing large ingots up to 800 millimeters in diameter and 3 meters in length. The Institute makes the guns and

sells them to Kombinat VEB Lokomotivebau-Elektrotechnische Werke (LEW) in Hennigsdorf, which produces large multichamber furnaces. Many of these furnaces are sold to the USSR. LEW has reportedly manufactured a multichamber furnace for the USSR with a power of 8 MW capable of melting 100-tonne ingots. [redacted]

The East German EB capability also extends to coating units. [redacted] would like to move its manufacturing capability to produce EB guns (and by extension coating furnaces) to the United States to shorten the manufacturing time and to compete more favorably [redacted]

Another facility of high competence, working in the area of basic processing, is the VEB Edelstahlwerk, Freital, directed by Dr. H. Fiedler. This facility has an excellent capability to design and produce plasma guns which are used to melt metals and for a variety of other metal processes. They have built a plasma arc remelt (PAR) furnace with a holding capability of 30 tonnes and plan to build a 50-tonne capacity furnace. The East Germans have developed these units in conjunction with Soviet technologists, the GDR designing and building the plasmatrons and the Soviets the furnaces. There are indications that the East Germans are not satisfied with this arrangement because the Soviets apparently take credit for the East German accomplishments. [redacted]

The East German capability in machine tools, robots, and flexible automation technology at least equals that of all other Warsaw Pact countries. The operational quality of machine tools produced in the GDR compares favorably to those produced in Western countries [redacted]

The East Germans have been manufacturing five-axis computer numerical controllers (CNCs), capable of three-axis simultaneous control, since 1982. Information on newer models of indigenously produced CNCs is not available. We believe, however, that the East Germans have sufficient know-how and manufacturing ability to produce the microprocessor controllers necessary to operate advanced flexible manufacturing systems (FMSs). This includes machine tool, robot, and process controllers. The VEB Erfurt Electronics "Friedrich Engels" Plant has set up a small production center for microelectronic controls. This center permits the rapid production of controls meeting the special purpose of the user. The Engels plant will design and manufacture future controls for newly developed pressing and plastics machines of the Shaping Technology Combine. Automation advances in East Germany, including the production of 45,000 robots by the end of 1985, are expected to increase production 500 percent over 1982 levels. [redacted]

The GDR has been one of the world's leaders in the implementation of FMSs. One system, the PRISMA II, has been operating for more than 12 years with productivity increases through software improvements. Software and its application to FMS is the most apparent machining-related technological area where the East Germans trail the West. [redacted]

The "Otto von Guericke" Technical Advanced School in Magdeburg has recently acquired a new laboratory that includes several computerized welding robots. This laboratory will be used for extensive research in the automation of welding technology. The computer-aided analysis and control of welding processes is something new for the GDR. All measurements are fed through suitable channels into a computer laboratory. Here, with the aid of appropriate devices, these measurements can be evaluated, analyzed in a model MC 80 small computer, and processed for further study [redacted]

During 1985, the Thale Iron and Foundry Plant will be converted from conventional steel production to powder metallurgy. The East Germans believe that this conversion can yield significant material-economic effects in the national economy. They state that Thale is among the pioneers in East German powder metallurgy. When compared with other technologies, the technique of pressing workpieces out of

25X1 25X1 25X1 25X1 25X1 25X1 25X1 25X1 25X1 25X1 25X1 iron powder renders most subsequent machining unnecessary. The parts receive their near final form during the pressing. The increasing use of pressed parts in the construction of machines, cars, and textile machinery, as well as in the office machine and electrical appliance industries, requires the large-scale production of iron powder. The new installation in the Thale steel plant is for this purpose. It will obtain the requisite molten metal from the plant's existing electric smelting furnaces that have already produced iron powder low in phosphorus, sulfur, and oxygen; this powder already meets the specifications for pressed welding electrodes. This plant, as it is presently set up, will not be capable of producing superalloy powders or parts. Superalloys are used extensively in critical parts for military systems. For example, the turbine parts of high-performance jet engines are made from superalloys. [redacted]

Some work on the explosive compaction of amorphous powders has been noted at the Institute of Solid State Physics of the GDR Academy of Sciences in Dresden. X-ray diffracted analysis indicated that the material remained in the amorphous state after compaction. It is not clear whether this work on amorphous alloys can be used for high-performance structural components, but it does suggest an interest in advancing rapid solidification technology—a new arena of materials science that has close ties to high-performance powder metallurgy. [redacted]

East German composites research appears to be aimed at supplementing Soviet research in metal matrix composites and in nondestructive testing (NDT). The Soviet and East German literature contains references to work occurring at the A. A. Baykov Institute of Metallurgy in Moscow on graphite/copper composites. In addition, a program involving East Germans, Poles, Hungarians, and Soviets involves investigating exoelectron emissions and their application to NDT of composites and other materials; US technologists who have reviewed this technique are not convinced of its practical application.

[redacted]

Electro-optics

Electro-optics (EO) technology is one of the most critical advanced technologies. EO technologies can be used in a variety of "smart" weapons systems as parts of sensor and signal processors. EO technologies can also be used for optical computing and for controlling other machines. Optical computing can be a very powerful tool for addressing very complex mathematical problems, and we believe that the Soviets lead the West in this. We do not know if the Soviets have passed any optical computing technology to the GDR. In fact, we have very little information on GDR EO capabilities, but the GDR has a history of precision optical manufacturing. [redacted] 25X1

Optics. The GDR's optical capability at Karl Zeiss-Jena has been utilized by the USSR for a myriad of programs since World War II. Much of the high technology developed in the State Optical Institute (GOI) at Leningrad was originally derived from Zeiss-Jena technology. The GDR's optical scientists have played a major role in solving the alignment problems 25X1 related to the "Delfin" glass laser system for fusion at the Lebedev Institute (FIAN) in Moscow. [redacted] 25X1 [redacted] 25X1 it seemed to be common practice that all optical instruments used in the Soviet satellites or in the Inter-Sputnik program were of East German manufacture from the Karl Zeiss-Jena firm. [redacted] 25X1

Lasers. Basic laser research in the GDR is directed by the Academy of Science. One of its major laser laboratories is the Central Institute for Optics and Spectroscopy (ZOS) in East Berlin. Because of the emphasis on spectroscopy, a large research program 25X1 exists to study dye lasers. These lasers are tunable over a large segment of the optical band and are, therefore, extremely useful for spectroscopy. In particular, scientists at ZOS have done research on the generation of very short pulses from a dye laser using a saturable absorber. New materials and methods for making tunable dye lasers have also been investigated. For example, a laser has been constructed using chlorophyll from plants. This laser was pumped by a nitrogen laser and was tuned from 660 to 685 nanometers. [redacted] 25X1

As part of an exchange program, ZOS scientists have worked at FIAN in Moscow, performing research on 25X1 semiconductor lasers. A cooperative development program has also existed between ZOS and the State

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Precision Engineering Works, Halle, to develop laser devices for machining materials. The first product of this cooperation was a 200-watt CO_2 laser, which was attached to a type K70 cutter. This device is now used in various industries and can cut any shape desired in both thin metals and fabrics. It is produced by the Central Institute for Welding Technology (ZIS), Halle, and is called the ZIS 738. [redacted]

Both optical elements and lasers are being studied at the Friedrich Schiller University at Jena. Carbon-dioxide lasers discharged by microwaves are being developed in a program sponsored by the GDR military and government. Ostensibly, these lasers would be used for the cutting, drilling, and annealing of various materials. Another more esoteric area of research at the University of Jena is on reflectors for X-ray lasers. The cooperation between Friedrich Schiller University and the Lebedev Institute in Moscow was identified in a 1979 talk in which G. Sklizkov described a unique X-ray microscope developed at the Physical Institute of the Friedrich Schiller University of Jena that is for diagnosing laser-produced plasmas. [redacted]

Pyroelectric Detector Research. Pyroelectric infrared (IR) detectors have applications in precise laser beam alignment, intruder alarms, remote temperature measurements, and thermal imaging. Their chief advantages are the potential for ambient temperature operation, broadband spectral response, and low cost. These characteristics are particularly attractive for thermal imaging applications where conventional semiconductor detectors require cooling, often down to 77 degrees Kelvin. Their operation is based on the pyroelectric effect. When IR radiation is absorbed in a pyroelectric material, a change in temperature occurs and this results in a change in material polarization. If this material is sandwiched between two electrodes and coupled to an amplifier, then the change in polarization will be reflected as a change in current in the external circuit. Pyroelectric detectors operating on this principle can be configured as single-element devices or multielement arrays and also can be linked to charge-coupled device (CCD) readout electronics. [redacted]

East Germany has an active pyroelectric detector research program. This program includes the investigation of pyroelectric materials properties, detector fabrication techniques, and applications. Their current emphasis probably is on fabrication and design techniques to increase detector performance. They are aware of US efforts and actively seek to benefit from them. Their interest in developing LiNbO3 and PVF2 indicates an emphasis on stability, robustness, and cost of manufacture. These are prime concerns in the production of military devices. They have the capability to fabricate advanced detector arrays for thermal imaging applications, but no production capability is evident. The research in coupling pyroelectric arrays with CCD output suggests an interest in developing this area. This technology could be applied to IR missile seekers. [redacted]

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Optoelectronic Devices. Micro-optoelectronic components, manufactured primarily by the Television Electronics Plant in Berlin, are used in almost all areas of the national economy. They convert electronic signals into optical signals and conversely. The spectrum of models includes signal lamps, (for example, light emitting diodes [LED]), information displays, picture reproduction sensors, picture recording sensors, components for radio transmitters and radio receivers, and couplers (SEK and controllers). The 2- to 5-mm coupler elements, which operate in the infrared light range, control and regulate motion processes in the production of industrial products and consumer goods. With their aid, for example, machine tools and cassette recorders can be automatically switched, television sets can be operated remotely, and electrical potentials of several thousand volts can be reliably disconnected. From 1975 to the present, more than 100 optoelectronic components have been developed and produced. [redacted]

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Advanced research is being done at the Dresden Technical University to develop an optoelectronic reflex sensor for optical tool geometry. This sensor could significantly improve machining efficiency in operations like turning, milling, and drilling by monitoring and compensating for tool wear. This sensor would also be useful for postprocess measurements. [redacted]

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Nuclear Technologies
The East Germans have a world-class production facility for both stable and radioisotopes at the Central Institute for Nuclear Research (CINR) at Rossendorf near Dresden. They export these isotopes. CINR has strong ties to the Soviet Nuclear Research Institute at Dubna, and the GDR has produced and shipped large quantities of the Nitrogen-15 isotope to the Soviet Union. 25X1

In 1979, East Germany had completed one 70-megawatt (MW) pressurized water reactor (PWR) and had two 440-MW and one 100-MW PWRs under construction. East Germany is heavily committed to nuclear power and, therefore, has many trained nuclear scientists and technicians. According to a recent German visitor, the Soviet Union has not allowed the GDR to develop a reactor fuel reprocessing capability. The GDR, however, is strong in the other areas of nuclear fuel cycle including production, radiation monitoring equipment, and waste handling. 25X1

Computers and Microelectronics
The GDR is the most advanced of the Bloc countries in the areas of microelectronics and computer systems. Their success is attributable to their well-funded efforts in industrial and economic espionage (estimated over 500 active agents), their pre/post-war technological base, and an excellent capability to transfer technology from the West through France, Italy, Austria, Japan, and West Germany. As a technical leader in CEMA, we believe that the GDR contributes computing technology to Warsaw Pact military programs, as well as conducting R&D for applications in East German weapon systems, command and control, and support to other military programs. 25X1

The East Germans are capable of technical innovation, are relatively successful manufacturers of computer goods as compared with their CEMA partners, and have consistently been a valuable conduit for the flow of Western technology into the Bloc. The greatest strength of the GDR is their competent engineering that enables successful production of computer equipment and other goods with imbedded computing technology, including military systems. Table 1 highlights East German strengths and weaknesses in computing technology. 25X1

Table 1
East German Computing

Strengths	Weaknesses
Hardware engineering	Dependence on other CEMA nations for materiel supply (for example, some microcircuit devices and peripherals)
Industrial applications (for example, flexible manufacturing systems, robot controls, and CNC)	Instrumentation (lack of high-quality instruments in adequate numbers to support RDT&E of their products)
Office automation (for example, word-processing and unit record systems)	Widely accessible microcomputers (low quality of machines impair the growth of new ideas and more applications)

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The GDR was probably the first Eastern Bloc country to obtain microchips, both logic and microprocessor (Intel 8080/8080A and Zilog Z8000), in quantities sufficient to export significant numbers of microcomputers to the USSR (approximately 1,000 K1520 computers based on the Intel 8080 in 1979). They have since developed their own production capability, which is very good. The GDR is probably attempting to produce a version of the Z8000 microprocessor. The East Germans market microprocessor-based systems for office automation, the machine tool industry (for example CNC and robot controls), and image processing. 25X1

The GDR appears to be the CEMA leader in development of flexible manufacturing systems including robots. They do competent R&D on robot/computer vision systems and the adaptive control of robots. Image-processing systems offer a solid market potential because of the cooperation between Robotron and Karl Zeiss-Jena. The Soviet Space Institute has a joint development with the East Germans on an image-processing system, A6471. 25X1

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[redacted]

The GDR is extremely adept in software development and is considered the best in the Eastern Bloc. More recently, they have concentrated efforts in software enhancement of existing machines in order to increase machine productivity. The ES-1056 is a software-enhanced ES-1055. Speculation is that efforts in software enhancements are necessary because of the current restriction placed on hardware technology transfer from the West. The GDR is currently responsible for software development for the Ryad program. [redacted] 25X1

CEMA countries' national computer projects were realigned to support the cooperative development of IBM 360 compatible systems in the Ryad program under the direction of the Soviets. The East Germans, in spite of their natural tendency to preserve autonomy and their independent success in the CEMA market with office automation, transitioned to the Ryad program. The ES-1040 computer introduced in 1972 by the Robotron plant achieved prominence in the Ryad 1 project by being a successful computer design; its success was enhanced by the serious problems with the ES-1050 and ES-1060—the only Ryad 1 models designed to have greater performance than the ES-1040. The German entry in Ryad 2 was the ES-1055 computer. Although it was a respectable machine, it did not earn a reputation similar to the ES-1040 and was never produced in quantity. The GDR's entry in the Ryad 3 project is the ES-1057. We do not know how successful this computer will be. [redacted]

Under the Ryad program the East Germans have produced a variety of peripherals including magnetic tape units, low-speed line printers, a video display system, and several data transmission devices from modems to terminals. We believe that they are quite dissatisfied with Bulgaria being assigned a leading role in the manufacture of high-capacity magnetic disks; and like most CEMA customers of disk units, the Germans are frustrated by the low quality of disk units shipped for use with their Ryad computers. The East Germans would like to produce high-capacity magnetic disks, but there are rumors of reliability problems with the GDR disks. [redacted]

[redacted]

[redacted] 25X1 25X1

Communications Technology

We believe the GDR is focusing on technological improvements to both the landline communications system and the backup microwave networks used by the East German Communist Party and the Ministry of Defense. These improvements include the use of pulse code modulation (PCM) equipment on both communications networks, the transistorization of the microwave networks, and the microwave networks. [redacted] 25X1

The GDR has been active in the development and utilization of PCM technology. Several firms manufacture PCM equipment, which has been exported to several nations including the Soviet Union, Hungary, and the People's Democratic Republic of Yemen. In 1984, the GDR and Poland were planning a program of scientific and technical cooperation for the development of new PCM technology and the marketing of already existing equipment to third parties. The GDR plans to use PCM technology on a new communications system for the energy sector, which is to be in use by 1987 or 1988. The East German Air Force/Air Defense (EGAF/AD) plans to use PCM equipment in conjunction with the FM-24/400 microwave radio system. [redacted] 25X1 25X1

The EGAF/AD began upgrading their communications facilities by installing the PM 2A/400 microwave radio system at least as early as November 1981. They planned to have their system fully operational by 1 November 1985. The PM 24/4000, which 25X1 25X1

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[redacted]

is a frequency-modulated, 24 channel microwave radio system operating in the UHF range, is gradually replacing the RVG-950 low-capacity system throughout the GDR. EGAF/AD began installing the FM960.11000 microwave system in 1984. The FM960.11000, which is a frequency-modulated 960-channel system operating in the SHF range, has been plagued with problems since its installation and is not yet fully operational. [redacted]

Other developments in communications technology include the following:

- The Ministry of Defense is planning to acquire a new voice communications device, designated the Alpha Memory, in 1986.

- The Koepenick Radio Works and the GDR Railroad developed a new VHF railroad communications system.

- The International Maritime Satellite Organization (INMARSAT) satellite communications equipment has been installed on GDR merchant vessels.

- The Statsionar-4 satellite earth stations in the GDR will be equipped with new transmitting and receiving equipment between 1985 and 1987 as part of the modernization of Intersputnik communications which includes conversion to digital communication.

[redacted]

East German S&T Visitors to the United States

This section is a review of East Germans who requested visits to the United States in S&T areas from 1975 to 1 March 1985. [redacted] No East German visits are on file prior to 1975, apparently because the United States did not have a formal diplomatic relationship with East Germany until then. Since 1975, however, only 310 East German S&T visitors requested entry into the United States. [redacted]

Table 2
Focus Categories

1. Computer networking	11. Microwave
2. Computer systems	12. Vehicular
3. Software	13. Optical and lasers
4. Automated real-time controls	14. Sensors
5. Materials	15. Undersea systems
6. Directed energy	17. Chemicals
7. Semiconductor and electronic components	18. Nuclear
8. Instrumentation	20. Agriculture
9. Telecommunications	21. Transportation
10. Communications, navigation, guidance, and control	22. Biology
	23. Medical science
	24. Earth sciences
	25. Mathematics
	26. Nonnuclear power

Note: No data are contained in the data base for focus categories 16 and 19. These were prospective MCTL categories which were deleted sometime after the data base was in operation.

[redacted]

A formal government-to-government S&T agreement has yet to be formulated. The East German S&T visit requests were made under the aegis of the US-GDR cultural agreement, various private arrangements, and business relationships with US firms. The absence of a formal S&T agreement has not been an obstacle for East Germans attending technical meetings in the United States, studying at US academic institutions, or visiting US companies. [redacted]

Data Availability

[redacted] The information was tabulated according to the focus categories, the visit purpose, and the year(s) for which the visit was requested. The focus categories are derived from the major headings contained in the Military Critical

[redacted]

Table 3
Visit Category by Year

Year	Academic	Conference	Commercial	Commercial Training	**Totals**
1975	1	2			**3**
1976	2				**2**
1977	1				**1**
1978	7	1	1		**9**
1979	23	8			**31**
1980	30	24	1	1	**56**
1981	33	38	6		**77**
1982	38	53			**91**
1983	20	46	5	10	**81**
1984	26	30	3	1	**60**
1985	9	2			**11**
Totals	**190**	**204**	**16**	**12**	**422**

Technologies List (MCTL). The individual specialties are reflected in the assignment of focus categories, but they are not used for tabulation purposes because of their lack of specificity, for example, physics, engineering, information processing, and so forth. The visit purposes are identified broadly as academic, conference, commercial, and commercial training. No attempt was made to tabulate specifically where the proposed visits were to occur because of the wide distribution among the facilities and locations listed under proposed visit itineraries

The purpose of the visit is tabulated for each individual by year. Hence, a given individual may be counted more than once if he requested entry into the United States in more than a single year or if he changed his visit purpose during his stay over a particular period. This factor accounts for the totals given in the tables and figures being in excess of 310.

Frequency of Visits
The lack of formal diplomatic relations between the United States and East Germany apparently served to inhibit S&T visits until 1975. The establishment of diplomatic arrangements, however, did not seem to act as catalyst for East German S&T visits since only 14 requests for visits in technical areas are recorded for the years 1975 through 1978 (see figure 1). In 1979, the number of requests increased to 30. Visit requests increased to a peak of 85 in 1982. Since 1982, the numbers decreased to 60 in 1984 with requests projected to be about 50 in 1985, if the current rate remains constant.

Purpose of Visits
The purpose of the visits is primarily conference attendance as both spectators and participants (see table 3). The kinds of conference visits included international and national society technical meetings, academic seminars, surveys of technical areas, exhibitions, and specialty conferences such as the Gordon Research Conferences. Academic visits were almost equal in number to conferences.

Study, research, exchange of research information, and teaching/lecturing were the main pursuits described under the academic category. The commercial visits were few and involved mainly business and trade visits. Commercial training visits were also few in

[redacted]
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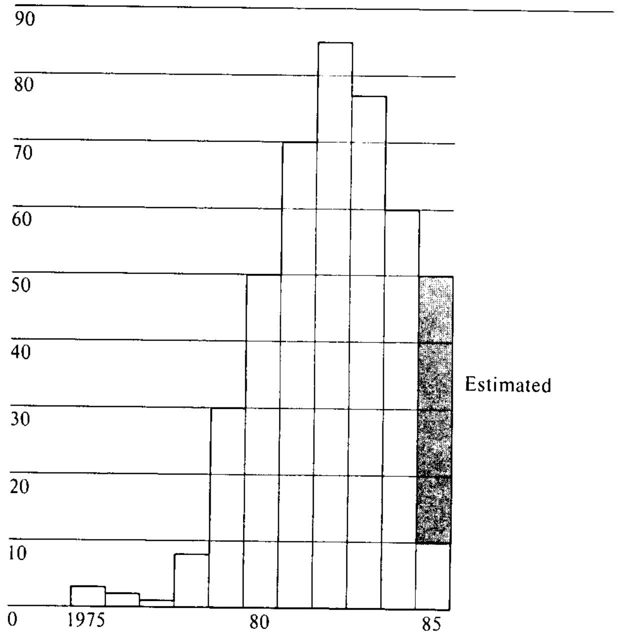
Figure 1
East Germany: S & T Visits, 1975-85



[redacted]
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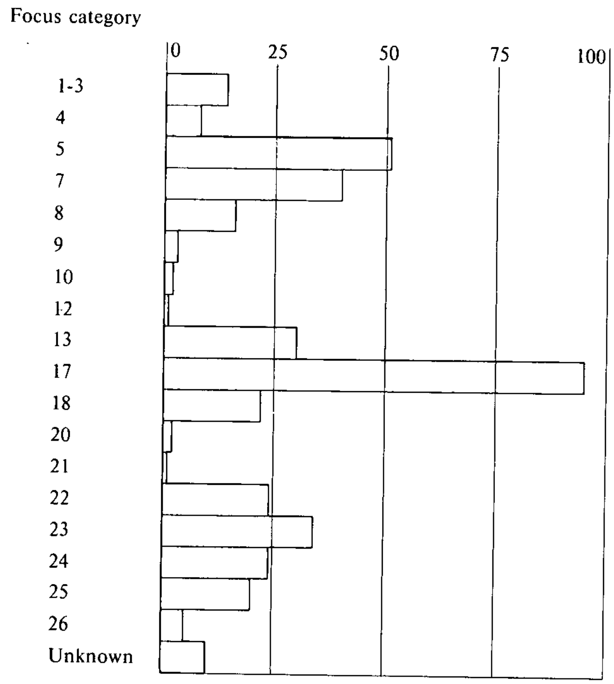
Figure 2
Number of Visits by Focus Category, 1975-85

Note: See table 2 to identify focus categories by number.



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number and covered food processing, chemical synthesis, and electronic instruments. Proposed visits encompassed all but four focus category areas which were directed energy, microwave, sensors, and undersea systems. The technical interests of the S&T visitors were concentrated in chemicals, materials, semiconductors and electronics, medical science, and optics and lasers (see figure 2). The number of visits by focus category and year is shown in table 4. Cursory reviews of visit concentrations for other Bloc countries have shown similar distributions. [redacted]

The data base information alone does not suggest a reason for the distribution of East German visit requests shown in figure 1. [redacted] East Germany is one of the three East European countries favored by the USSR for collecting S&T intelligence, the others being Poland and Hungary. The decline and resurgence of US-USSR relations could account for the up-and-down distribution of visits shown in figure 1. US-USSR relations were beginning to decline in the 1978-79 time period due, in part, to the imposition of special trade controls particularly in the petroleum and natural gas exploration and development areas. East German S&T interests increased significantly in

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Table 4
Number of Visits by Focus Category and Year

Focus Category [a]	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	Totals
1 - 3				2	2		4	2		4		**14**
4				2	1				2	3		**8**
5				1	3	10	11	7	10	7	1	**50**
7		1	1		4	6	5	8	5	7	3	**40**
8					1	4	2	2	5	1	1	**16**
9	1				1		1					**3**
10							2					**2**
11												
12					1							**1**
13				1	1	2	3	7	10	5		**29**
14												
15												
17	1			1	7	13	14	25	17	15	2	**95**
18	1	1			3	3	1	5	4	4		**22**
20							1				1	**2**
21										1		**1**
22					2	3	3	4	6	4	1	**23**
23				1	1	1	7	17	3	4		**34**
24					1	3	11		7	2		**24**
25					2	2	3	7	4		1	**19**
26						2	1		1	1		**5**
Unknown						1	1	1	4	2		**19**
Totals	**3**	**2**	**1**	**8**	**30**	**50**	**70**	**85**	**78**	**60**	**10**	**397**

[a] See table 2 to identify focus categories by number.

Note: No data are contained in the data base for focus categories 6, 16, and 19.

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1979. During 1980-81, a further deterioration in US-USSR relations occurred as evidenced by US reluctance to renew various S&T agreements, an increase in export control restrictions, and the Soviet invasion into Afghanistan. East German S&T visit requests continued to increase from 1980 through 1982. A low point in US-USSR relations was reached in 1982 and 1983. At the same time, a peak number of East German visit requests were received. As the United States and the USSR began to reconcile some of their differences in 1983-84, the East German S&T visit requests declined noticeably. This sequence of events suggests that the USSR may have been using East German resources to gain S&T information which could not be acquired directly by the Soviets due to constraints imposed by the United States. 25X1

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